

ATTACHMENT 9
EPA TARGETED NATIONAL SEWAGE SLUDGE SURVEY



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Targeted National Sewage Sludge Survey

Sampling and Analysis Technical Report

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Executive Summary

This Sampling and Analysis Technical Report (“Technical Report”) describes the sampling and analysis activities conducted by EPA in support of the Targeted National Sewage Sludge Survey (TNSSS). The TNSSS was designed to: 1) obtain updated occurrence information on nine analytes of potential concern, and 2) obtain occurrence information on a number of contaminants of emerging interest identified by EPA and the National Research Council (NRC). The objective of the survey was to obtain national estimates of the concentrations of these pollutants in sewage sludge for use in assessing if exposures may be occurring and whether those levels may be of concern.

Final sewage sludge is defined as the liquid, solid, or semi-solid residue generated during the treatment of domestic sewage, receiving secondary treatment or better, in a treatment works, which may include sewage sludge processed to meet land application standards. The publicly owned treatment works (POTWs) included in the survey were selected without consideration of their sewage sludge use or disposal practices.

For this survey, EPA focused its efforts on POTWs that treat more than one million gallons of wastewater per day (MGD). This group of facilities collectively generates approximately 94 percent of the wastewater flow in the nation. To be eligible for the survey, EPA also required that a POTW be located in the contiguous United States and employ secondary treatment or better. From the 3,337 POTWs that met the criteria, EPA statistically selected 74 facilities in 35 states for the survey and collected biosolids samples from those facilities. Whether the facility recycles the sewage sludge to land or disposes of it via incineration or surface disposal was not a consideration for selecting a facility for inclusion in the survey. By using statistical methods, the concentration measurements can be extrapolated to the entire population of 3,337 POTWs.

EPA collected samples between August 2006 and March 2007. EPA collected 84 samples of sewage sludge from 74 facilities, one from each of 64 POTWs, as well as two samples at the remaining ten facilities (either because the facility had more than one treatment system and produced two types of final sewage sludge, or for quality assurance purposes). EPA conducted analysis of sewage sludge samples for 145 analytes, including four anions (nitrite/nitrate, fluoride, water-extractable phosphorus), 28 metals, four polycyclic aromatic hydrocarbons, two semi-volatiles, 11 flame retardants, 72 pharmaceuticals, and 25 steroids and hormones.

The survey used both well-established multi-laboratory validated EPA procedures as well as three analytical methods that were developed or updated for the survey. The two new methods are single-lab validated methods for pharmaceuticals (EPA Method 1694), and steroids and hormones (EPA Method 1698). The updated multi-lab validated method is for flame retardants (EPA Method 1614).

EPA took steps to ensure that the results were comparable across all of the facilities sampled. The percent solids in the various sewage sludge samples range from 0.14 to 94.9. To ensure comparability of results, all sample results are reported on a dry-weight basis.

EPA subjected all of the analytical results generated by the laboratories to data review procedures. These procedures used review protocols to ensure that the results met EPA's objectives for data quality.

This Technical Report includes the number of samples in which each analyte was reported, along with minimum and maximum measurements. Reported concentrations and frequency of detects are limited by the sensitivity of the analytical methods used. Some analytes were found in all 84 samples, while others were found in none or only a few of the sewage sludge samples. The minimum concentration is the lowest value reported as present in any sample. EPA did not report a minimum or maximum value for those analytes that were not detected (i.e., a situation that occurred for some of the pharmaceuticals, steroids and hormones). For these situations, EPA used "ND" to indicate that the minimum and maximum values were "not detected." The maximum concentration is the highest value reported as present in any sample.

Briefly, the survey found:

- The four anions were found in every sample.
- 27 metals were found in virtually every sample, with one metal (antimony) found in no less than 72 samples.
- Of the six semivolatile organics and polycyclic aromatic hydrocarbons, four were found in at least 72 samples, one was found in 63 samples, and one was found in 39 samples.
- Of the 72 pharmaceuticals, three (i.e., ciprofloxacin, diphenhydramine, and triclocarban) were found in all 84 samples and nine were found in at least 80 of the samples. However, 15 pharmaceuticals were not found in any sample and 29 were found in fewer than three samples.
- Of the 25 steroids and hormones, three steroids (i.e., campesterol, cholestanol, and coprostanol) were found in all 84 samples and six steroids were found in at least 80 of the samples. One hormone (i.e., 17 α -ethynyl estradiol) was not found in any sample and five hormones were found in fewer than six samples.
- All of the flame retardants except one (BDE-138) were found every sample or all but one sample.

It is not appropriate to speculate on the significance of the results until a proper evaluation has been completed and reviewed. EPA plans to evaluate the pollutants identified by the survey as being present in sewage sludge. As its first priority, using the survey information, EPA has begun assessing the nine pollutants identified from the 2003 biennial review as needing updated concentration information and molybdenum to determine whether additional action may be necessary. Later this year, EPA expects to initiate evaluations of other pollutants in the survey that may warrant further consideration. The evaluations will depend on the availability of data needed to conduct the evaluations.